

CLAIMS

1. A source follower having an input terminal and an output terminal, the source follower comprising:

a first device having first conducting properties connected to the input terminal and the output terminal, the first device further coupled between a first voltage source and a second voltage source;

a current source coupled to the second voltage source, the first device, and the output terminal,

wherein if the first device is not conducting, then the current source pulls a voltage on the output terminal to a voltage provided by the second voltage source, and

wherein if the first device is conducting, then the first device pulls the voltage on the output terminal to a voltage provided by the first voltage source minus a threshold voltage of the first device;

a second device having second conducting properties coupled between the output terminal and the first voltage source,

wherein the second conducting properties are different than the first conducting properties,

wherein the second device receives a different input signal than the first device, and

wherein the second device, when conducting, pulls the voltage on the output terminal to the voltage provided by the first voltage source.

2. The source follower of Claim 1, wherein the second device conducts only when the first device provides the voltage provided by the first voltage source minus a

threshold voltage of the first device on the output terminal.

3. The source follower of Claim 1, wherein the first device includes a p-channel transistor and the second device includes an n-channel transistor.

4. The source follower of Claim 3, wherein the first voltage source is a low voltage source and the second voltage source is a high voltage source.

5. The source follower of Claim 1, wherein the first device includes an n-channel transistor and the second device includes a p-channel transistor.

6. The source follower of Claim 5, wherein the first voltage source is a high voltage source and the second voltage source is a low voltage source.

7. The source follower of Claim 1, further including a current limiting control circuit coupled to the first and second devices, wherein the current limiting control circuit disables the first and second devices when the source follower is subjected to abnormal operating conditions.

8. An amplifier circuit providing a rail-to-rail voltage swing, the amplifier circuit comprising:

a source follower having an input terminal and an output terminal, the source follower further including:

a first device having first conducting properties coupled to the input terminal and the output terminal,

the first device further coupled between a first voltage source and a second voltage source;

a current source coupled to the first voltage source, the first device, and the output terminal,

wherein if the first device is not conducting, then the current source pulls a voltage on the output terminal to a voltage provided by the second voltage source, and

wherein if the first device is conducting, then the first device pulls the voltage on the output terminal to a voltage provided by the first voltage source minus a threshold voltage of the first device;

a second device having second conducting properties coupled between the output terminal and the first voltage source,

wherein the second conducting properties are different than the first conducting properties,

wherein the second device receives a different input signal than the first device, and

wherein the second device, when conducting, pulls the voltage on the output terminal to the voltage provided by the first voltage source; and

a sensing circuit for triggering the second device to conduct when the amplifier reaches a saturation point.

9. The amplifier of Claim 8, wherein the saturation point occurs when the first device provides the voltage provided by the first voltage source minus a threshold voltage of the first device on the output terminal.

10. The amplifier of Claim 8, wherein the first device includes a p-channel transistor and the second device includes an n-channel transistor.

11. The amplifier of Claim 10, wherein the first voltage source is a low voltage source and the second voltage source is a high voltage source.

12. The amplifier of Claim 8, wherein the first device includes an n-channel transistor and the second device includes a p-channel transistor.

13. The amplifier of Claim 12, wherein the first voltage source is a high voltage source and the second voltage source is a low voltage source.

14. The amplifier of Claim 8, further including a current limiting control circuit coupled to the first and second devices, wherein the current limiting control circuit disables the first and second devices when the amplifier is subjected to abnormal operating conditions.

15. A source follower comprising:
a first transistor having a first channel type, wherein a gate of the first transistor is coupled to an input terminal of the source follower, and wherein a drain of the first transistor is coupled to a first voltage rail;
a current source coupled between a source of the first transistor and a second voltage rail; and
a second transistor having a second channel type different than the first channel type, wherein a gate of the second transistor receives a signal triggered by a

limit associated with the first transistor, wherein a source of the second transistor is coupled to the first voltage rail, and wherein a drain of the second transistor is coupled to the source of the first transistor and an output terminal of the source follower.

16. The source follower of Claim 15, wherein the source follower forms part of an amplifier, and wherein a portion of the amplifier generates the signal triggered by the limit associated with the first transistor.

17. The source follower of Claim 16, wherein the limit associated with the first transistor includes a threshold voltage.

18. The source follower of Claim 16, wherein the limit associated with the first transistor occurs at a saturation point of the amplifier.

19. A system for providing a rail-to-rail voltage, the system comprising:

means for driving an output voltage of the system to a first predetermined voltage, which is less than a first rail voltage; and

means for driving the output voltage of the system to the first rail voltage after sensing the first predetermined voltage.

20. The system of Claim 19, further including means for driving the output voltage of the system to a second rail voltage.

21. A method for providing a rail-to-rail voltage, the method comprising:

driving an output voltage of a system to a first predetermined voltage, which is less than a first rail voltage; and

after sensing the first predetermined voltage, driving the output voltage of the system to the first rail voltage.

22. The method of Claim 21, further including driving the output voltage of the system to a second rail voltage.

23. An amplifier circuit providing a rail-to-rail voltage, the amplifier circuit comprising:

a folded cascode amplifier;

an operational transconductance amplifier (OTA);

a source follower including:

a primary device for driving an output voltage near a first voltage rail, wherein the primary device receives an output of the folded cascode amplifier; and

a secondary device for driving the output voltage to the first voltage rail when the primary device reaches its limit, wherein the secondary device receives an output of the OTA; and

a current source for driving the output voltage to a second voltage rail when the primary and secondary devices are not conducting.